the same Gardens for April, contains, in addition to some natural history notes, a continuation of the descriptive list of West India and Guiana ferns.

A SHORT obituary notice of the late Franz Ritter von Hauer appeared in NATURE for April 13, 1899. A full account of the life and labours of this distinguished geologist has now been published by Dr. E. Tietze (*Jahrb. k.k. geol. Reichs.* Wien, Bd. 49). It is accompanied by a portrait, and by a list of geological papers and books dating from 1846 to 1897.

MESSRS. WILLIAMS AND NORGATE have just published a sixth revised edition of "Prehistoric Times as illustrated by Ancient Remains and the Manners and Customs of Modern Savages," by Lord Avebury (Sir John Lubbock). The first edition was published more than thirty-five years ago.

PROF. PRANTL'S "Lehrbuch der Botanik," upon which Prof. Sydney Vines' "Students' Text-book of Botany" is based, has reached an eleventh edition. The new edition has been revised and enlarged by Dr. Ferdinand Pax, professor of botany, and director of the Botanical Gardens, at Breslau. Mr. W. Englemann, Leipzig, is the publisher.

PROF. VIVIAN B. LEWES has in the press an exhaustive work on acetylene gas—a handbook for the student and manufacturer. The book will contain over 250 illustrations, and comprises a history of acetylene, its preparation, properties and chemical reactions, together with a complete list of legal enactments in full concerning its manufacture, patents, and other important data. Messrs. Archibald Constable and Co. are the publishers.

TWO publications of interest to botanists will be issued from the Clarendon Press before long—the first part of the authorised English edition by Prof. J. B. Balfour of Dr. K. Goebel's "Organography of Plants," and Dr. A. Coppen Jones's translation of Prof. Alfred Fischer's "Structure and Functions of Bacteria." The former brings within reach of English students the only book of recent years upon its special subject; the latter is the only work on bacteriology of similar scope and mode of treatment that has appeared in England since Dr. A. de Bary's "Lectures on Bacteria," a second edition of which appeared in 1887. This translation of Prof. Fischer's "Vorlesungen über Bakterien" should be welcome in pathological laboratories.

THE Orient Company announce that the cruise to Norway, Spitsbergen and Iceland will be repeated this summer. Their steamship *Cuzco*, 3912 tons register, is appointed to leave London on July 3, and to arrive back on August 4. After visiting some of the most interesting Norwegian fiords, the *Cuzco* will proceed to Spitsbergen, thus affording an opportunity of viewing the midnight sun, as for five days and nights after the ship leaves the North Cape the sun will be continuously above the horizon. Thereafter the *Cuzco* will proceed to Iceland, and her contemplated stay there of three days will enable passengers to see some of the most interesting sights in this remote island. The Faroe Islands will also be visited on the way back to London, *viâ* Leith.

THE purification of mercury is frequently necessary in physical and physico-chemical work, the process generally relied upon being distillation *in vacuo*. The apparatus in general use for this purpose, although convenient, has the disadvantage of being somewhat fragile, and requires large quantities of mercury. Some doubts, moreover, have been thrown on the efficacy of distillation as a purifying process, as Victor Meyer, in 1887, showed that traces of foreign metals passed over even after repeated redistillations. According to G. A. Hulett (*Zeitschrift für physikalische Chemie*, xxxiii. p. 611), these traces of foreign metals are carried over mechanically during the bumping of the boiling mercury; and if measures are taken to prevent this bumping, perfectly pure mercury can be obtained in one distillation. Instead of the complicated apparatus of Weinhold, or its various modifications, a slight modification of the arrangement of two distilling flasks, with a capillary tube for admitting air, as commonly employed in organic work, was found to work perfectly.

PROF. RICHARDS, of Harvard, continuing his valuable redetermination of atomic weights, has lately published, in conjunction with Mr. G. P. Baxter, a preliminary paper on the atomic weight of iron. He points out that the value Fe=56, which is now used, is practically based on work of fifty years since—being Wackenroder's corrected value of Berzelius' result, which was based upon the conversion of metallic iron into ferric oxide. In their preliminary determinations, Messrs. Richards and Baxter have reduced ferric oxide to the metal. The ferric oxide was prepared in the first case from ferric hydrate, which itself was prepared with elaborate precautions from very pure iron ribbon. The mean of two closely agreeing determinations gave Fe=55·900. In the second case, ferric oxide was prepared with equal care from ferric nitrate. The mean value of five determinations gave Fe=55·883. Further determinations are promised, but meanwhile the higher value of the older number (Fe=56) is explained as probably due to one or more of the following causes:—The possible presence of magnetic oxide in the ferric oxide; the possibility of incomplete reduction during the analysis of the substance; the possible presence of alkaline, siliceous or other non-reducible material. At the present stage of the work 55·88 may be taken as the most probable value.

THE additions to the Zoological Society's Gardens during the past week include a Sykes's Monkey (*Cercopithecus albigularis*) from British Central Africa, presented by Mr. C. H. Ambruster; a Barbary Ape (*Macacus inuus*) from Algeria, presented by Mr. R. S. Allen; a Large Red Flying Squirrel (*Pteromys inornatus*) from Northern India, presented by Mr. A. Dudley Yorke; three Goshawks (*Astur palumbarius*), European, presented by Mr. John Simonds; a Little Egret (*Ardea garzetta*) from North-west Africa, presented by Mr. J. H. Yates; an Allen's Porphyrio (*Hydrornia alleni*), captured at sea, presented by Miss Wallace; a West African Python (*Python sebae*) from West Africa, presented by Francis E. Colenso; a Green Lizard (*Lacerta viridis*), European, presented by Miss Mabel A. Heaton; a Common Snake (*Tropidonotus natrix*), British; two Mocassin Snakes (*Tropidonotus fasciatus*) from North America, presented by Mr. W. H. St. Quintin; a Lion (*Felis leo*, ♂) from Kattiwar; a Nylghaie (*Boselaphus tragocamelus*, ♂), two Four-horned Antelopes (*Tetraceros quadricornis*), three Indian Gazelles (*Gazella bennetti*) from India; four Bearded Lizards (*Amphilolurus barbatus*), two Stump-tailed Skinks (*Trachysaurus rugosus*) from Australia, five American Box Tortoises (*Cistudo carolina*), six Stink-pot Mud Terrapins (*Cinosternum odoratum*) from North America, deposited; a Rocky Mountain Goat (*Haploceros montana*, ♂) from British Colombia, two Cunning Bassaris (*Bassaris astuta*) from Mexico, five Gentoo Penguins (*Pygosceles taeniatus*) from the Falkland Islands, a Three-toed Sloth (*Bradypus tridactylus*) from British Guiana, purchased; two Japanese Deer (*Cervus sika*), a Burchell's Zebra (*Equus burchelli*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ROTATION PERIOD OF VENUS.—In the *Astronomische Nachrichten* (Bd. 152, No. 3641), Prof. A. Belopolsky gives the detailed measurements of the photographs of the spectrum of Venus taken during the recent favourable disposition, from which he has been enabled to confirm the short rotation period of the planet.

The spectrograms have been made with the 30-inch refractor at the Observatory of Pulkowa, using two different spectrographs,

one of which was provided with two simple prisms, the other having three compound prisms. The spectra being obtained, the inclination of the spectral lines and the difference of wave-length of the light coming from the two opposite equatorial limbs of the planet is measured, and after corrections being applied for the inclination of the planet's equator to the line of sight, the resulting displacement indicates the equatorial velocity. As the light from the planet is reflected sunlight, the value measured is, of course, double the actual velocity.

The complete measures from fourteen plates taken with the two-prism spectrograph, and from five obtained with the instrument furnished with three compound prisms, are given. The values adopted are the means of measurements of from six to sixteen spectrum lines on each plate.

The photographs were obtained on the evenings of March 25, 30; April 4, 6, 7, 8, 10, 11, 20, 28; May 4, 5, 13, with exposures varying from 7m. to 60m. The angular diameter of the planet varied from 8″·6 to 11″·0. With the 30-inch refractor, of about 40 feet focal length, the linear diameter at the principal focus was 1·2 mm., and this was further reduced by the relative foci of collimator and camera objectives to 0·8 mm. on the photographic plate.

From the difficulty of the determination it is to be expected that the several means should vary for the different plates; but the extreme values given still prove the short rotation period. Taking the diameter of Venus to be 12,700 km., the values of the equatorial velocity (v) are as follows, the corresponding time of rotation (T) being placed under each :—

v =	0·7	0·5	0·462	0·45	0·3 km. per sec.
T =	15·9	22·1	24·0	24·6	37·0 hours.

The author expresses the hope that the astronomers having the control of the large telescopes at the Potsdam, Lick and Yerkes Observatories will repeat his observations for confirmation or revision.

NEW VARIABLE IN AURIGA.—Dr. T. D. Anderson, of Edinburgh, announces in the *Astronomische Nachrichten* (Bd. 152 No. 3642), the detection of a new variable star in Auriga. It is not charted in the B.D., and has the following position :—

R.A. = 6h 0·9m.
Decl. = + 50° 14′ } (1855·0)

The changes in brightness during April and May 1900 were from 8·3 to 8·8 magnitude.

PHOTOGRAPHIC OBSERVATIONS OF SATELLITE OF NEPTUNE.—In the *Astronomische Nachrichten* (Bd. 152 No. 3642), M. S. Kostinsky gives the particulars relating to a series of determinations of the satellite of Neptune, obtained from measures of photographs taken with a telescope of 13 inches aperture at Pulkowa. Many of the difficulties encountered in the photographic delineation of two neighbouring objects of very different brightness have been previously discussed by the author (*Bull. de l'Acad. Impér. des Sc. St. Pétersbourg*, vol. vii. November 1897). In the present case of Neptune the problem is rendered slightly less difficult by the feeble brightness of the planet and the slow movement of the satellite.

The photographs described were obtained during the period 1899 February 4–March 25, the plates having exposures varying from 20m. to 60m. A table giving the corresponding calculated and observed values shows the method to be very accurate.

SOME NOTES ON THE LATE PROF. PIAZZI SMYTH'S WORK IN SPECTROSCOPY.

LAMENTING, as we must do, that time has stolen from us a mighty Ajax in the field of science, a sturdy, patient Atlas who through more than half of this fast waning century robustly upheld on his strong shoulders the growing spires and architraves of science's ever-increasing edifice, it is with keenest sorrow that the writer of these notes turns over the ample pages, rich to profusion in details and superb in colour, of the monumental works of spectroscopy left to us by the late Prof. C. Piazzi Smyth, with the nearly hopeless intention of endeavouring to give a short account of some of his most conspicuously important contributions to that branch of science. The late Prof. Smyth was, indeed, no *dilettante* in the intricate and difficult but fertile and alluring byways of science to which his leisure moments were devoted; and he was far from conceitedly or affectedly pedantic in the grasp of science which he brought to bear upon his philosophical investigations. Although these embraced a range of astronomical and meteorological subjects which would singly engage all the energies of most men, and their whole lifetimes to study with success, yet his mastery of the state of science in the questions which he set himself to solve or to explore, was acquired with so much inventive skill, unsparing pains and ardour, as always to make the character of the work which he accomplished in them permanent and thorough. Well accustomed as he was from his youth, and trained from boyhood,[1] to delicate telescopic, angular and micrometrical measurements by eye and hand, he further possessed a gift of great artistic skill in committing to paper, canvas, and even to frescoes, beautiful drawings, photographs and coloured paintings of the scenes of travel which he witnessed, and of sights which clouds, the heavens, or his laboratory experiments disclosed to him. This accomplishment, well illustrated, long ago, by his publication in the Edinburgh *Philosophical Transactions* (vol. xx. pt. iii.) of a scene of darkness on the coast of Norway, near Bergen, during the Total Solar Eclipse of July 1851, contributed again in colours from his original, carefully kept paintings of the scene, together with a similar view of the Zodiacal Light as seen at Palermo in April 1872, to a new illustrated work on astronomy published by Messrs. Cassell and Co. in 1894, led him to leave to others the study of the actinic spectrum-regions with the aid of photography, and to restrict his spectrum-measurements entirely to all that could be seen and measured by the eye alone, of the solar spectrum, or of the characteristic features of gaseous bright-line spectra, in the whole visible portion of the spectrum only.

In his keen perception of all the grand sublimities of law and order by which Nature's works are everywhere controlled and guided and sustained, and in the constant intentness of his mind to seek out these nature's workings, and to promulgate lucidly and clearly his own perceptions and interpretations of them, Kirchhoff's great discovery, in 1859, that the chemical constitution of the sun could be read in its light's prismatic spectrum, constrained him like a spell, as it quickly did many other physicists, to devote much of his leisure time and abilities to spectro-chemical researches. New striking truths were taught in 1860–61 by Sir William Huggins' not less surprising discovery from observations of their spectra, of the gaseous conditions of certain nebulæ, and by Sir David Brewster's and Dr. J. H. Gladstone's majestically mapped separation from the really solar dark lines in the sun's spectrum, of its low sun, or terrestrial atmospheric lines, soon afterwards distinguished by Secchi, Ångström and the first detector of the "rain-band" near solar D, in America, Dr. J. P. Cooke, and especially by Dr. Janssen's observations among the high Alps of Switzerland and experiments with a long steam-tube in Paris, in 1866–7, into "aqueous-vapour" and "dry-air" telluric lines. Kirchhoff's and Hofmann's first chemical investigation of the solar spectrum was rapidly extended in the years from 1859 to 1868, with tables of metallic and other elementary line-spectra by Huggins and Miller, Mascart, Plücker, Ditscheiner, Van der Willigen, Thalen, Lockyer and others, into a wonderfully novel panorama field of spectrum-analysis, chiefly applicable at first to celestial chemistry and physics, but in such skilled hands as those of Bunsen, Crookes, Reich and Richter, and later of Lecoq de Boisbaudran and other able chemists, to the discovery also of new terrestrial elements. The appearance at Upsala, in 1868, of Ångström and Thalen's classically accurate and chemically expounded "Normal Solar Spectrum" map, with its line-places in a natural diffraction-spectrum order of wave-length progression reckoned in "tenth-metres," or $(10)^{10}$th parts of a metre as scale-units of wave-length,[2] and the detection with spectroscopes in the total solar eclipse of the same year in India, of the hydrogen-flame nature of the sun's red prominences, seen in full sunshine there by Dr. Janssen and almost simultaneously also by Sir J. N. Lockyer in England, afforded to the new

[1] Under Sir Thomas Maclear's care, in 1836, at the age of seventeen; at the famous Observatory at the Cape of Good Hope, where, during the last three years, the presence of oxygen was discovered by its line-spectrum in certain southern stars by the indefatigable English amateur astronomer, Mr. F. Maclean; and where both that discovery and another by Sir J. N. Lockyer of the presence of silicium in the same stars, have been confirmed, and made independently by its energetic Director, Sir David Gill, with a noble spectrophotographic 24-inch refracting telescope presented to the Observatory under his own directions and liberal care for its completeness by the same munificent explorer of stellar spectra in the northern and the southern heavens, Mr. Frank Maclean.

[2] It has now become a common usage in spectroscopy, microscopy and molecular physics, to reckon such small quantities as light wave-lengths in a tenfold larger unit than the Ångström one, denoting it by "$\mu\mu$," the thousandth part of "μ," the thousandth part of a millimetre, "mm."